APPENDIX K

SECTION 404(b)(1) ANALYSIS

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APPENDIX K
SECTION 404(B)(1) ANALYSIS

Compliance with the U.S. Environmental Protection Agency's (EPA's) Section 404(b)(1) Guidelines (40 CFR Part 230) is a prerequisite to issuance of a Section 404 Clean Water Act permit by the U.S. Army Corps of Engineers (Corps). In order for a project to comply with the guidelines, a project must be the least environmentally damaging practicable alternative and must not cause or contribute to a significant degradation of waters of the United States. The Corps conducted a 404(b)(1) analysis concurrent with the Nebraska Highway 12 (N-12) Niobrara East and West Environmental Impact Statement (EIS). The 404(b)(1) analysis was conducted to determine the least environmentally damaging practicable alternative. Alternatives were screened according to National Environmental Policy Act (NEPA) guidelines as well as the 404(b)(1) guidelines. The following sections describe the assessment of impacts to the aquatic environment that could result from the N-12 Project. Where the impacts were described previously and adequately in the N-12 EIS, a reference to that resource section in Chapter 4.0 is provided.

K.1 POTENTIAL IMPACTS ON PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE AQUATIC ECOSYSTEM (SUBPART C)

K.1.1 Substrate (230.20)

The substrate of the aquatic ecosystem underlies open waters of the United States and constitutes the surface of wetlands. It consists of organic and inorganic solid materials and includes water and other liquids or gases that fill the spaces between solid particles (40 CFR 230.20(a)).

Possible loss of environmental characteristics and values: The discharge of dredged or fill material can result in varying degrees of change in the complex physical, chemical and biological characteristics of the substrate. Discharges which alter substrate elevation or contours can result in changes in water circulation, depth, current pattern, water fluctuation and water temperature. Discharges may adversely affect bottom-dwelling organisms at the site by smothering immobile forms or forcing mobile forms to migrate. Benthic forms present prior to a discharge are unlikely to recolonize on the discharged material if it is very dissimilar from that of the discharge site. Erosion, slumping, or lateral displacement of surrounding bottom of such deposits can adversely affect areas of the substrate outside of the perimeters of the disposal site by changing or destroying habitat. The bulk and composition of the discharged material and the location, method, and timing or discharges may all influence the degree of impact on the substrate (40 CFR 230.20(b)).

In the N-12 EIS, Section 4.5, Wetlands and Waters of the U.S., and Appendix F, Wetlands and Other Waters of the U.S. Technical Memorandum, contain a detailed description of wetlands and other waters of the U.S. that would be affected by the Project. Impacts on the substrate under wetlands and open water are summarized in Table K-1, which provides wetland impacts resulting from each of the build alternatives. Provided below are brief descriptions of the wetland impacts resulting from each alternative.

No-Action Alternative

The No-Action Alternative would involve continued maintenance of the existing N-12 roadway. No direct effects to the substrate under wetlands and other waters of the U.S. are anticipated. Indirect effects could occur to the substrate if increasing flooding of the roadway causes additional erosion.

Alternative A1

Total direct effects to the substrate under wetlands are 71.8 acres for the west segment and 75.6 acres for the east segment, for a total of 147.4 acres of impact. Total direct effects to the substrate under open water are 16.81 acres for the west segment and 13.07 acres for the east segment, for a total of 29.88 acres of impact.

Alternative A2

Total direct effects to the substrate under wetlands are 71.0 acres for the west segment and 71.3 acres for the east segment, for a total of 142.3 acres of impact. Total direct effects to the substrate under open water are 10.52 acres for the west segment and 8.37 acres for the east segment, for a total of 18.89 acres of impact.

Alternative A3

Total direct effects to the substrate under wetlands are 57.5 acres for the west segment and 64.8 acres for the east segment, for a total of 122.3 acres of impact. Total direct effects to the substrate under open water are 6.03 acres for the west segment and 9.39 acres for the east segment, for a total of 15.42 acres of impact.

NDOR's Applied-for Alternative, Alternative A7

Total direct to the substrate under wetlands are 44.8 acres in the west segment and 46.0 acres in the east segment, for a total of 90.8 acres of impact. Total direct effects to the substrate under open water are 2.84 for the west segment and 2.31 for the east segment, for a total of 5.15.

K.1.2 Suspended Particulate Materials/Turbidity (230.21)

Suspended particulates in the aquatic ecosystem consist of fine-grained mineral particles, usually smaller than silt, and organic particles. Suspended particulates may enter water bodies as a result of land runoff, flooding, vegetative and planktonic breakdown, resuspension of bottom sediments, and man's activities, including dredging and filling. Particulates may remain suspended in the water column for variable periods of time as a result of such factors as agitation of the water mass, particulate specific gravity, particle shape, and physical and chemical properties of particle surfaces (40 CFR 230.21(a)).

Possible loss of environmental characteristics and values: The discharge of dredged or fill material can result in greatly elevated levels of suspended particulates in the water column for varying lengths of time. These new levels may reduce light penetration and lower the rate of photosynthesis and the primary productivity of an aquatic area if they last long enough. Sight-dependent species may suffer reduced feeding ability leading to limited growth and lowered resistance to disease if high levels of

suspended particulates persist. The biological and chemical content of the suspended material may react with the dissolved oxygen in the water, which can result in oxygen depletion. Toxic metals and organics, pathogens, and viruses absorbed or absorbed to fine-grained particulates in the material may become biologically available to organisms either in the water column or on the substrate. Significant increases in suspended particulate levels create turbid plumes which are highly visible and aesthetically displeasing. The extent and persistence of these adverse impacts caused by discharges depend upon the relative increase in suspended particulates above the amount occurring naturally, the duration of the higher levels, the current patterns, water level, and fluctuations present when such discharges occur, the volume, rate and duration of the discharge, particulate deposition, and the seasonal timing of the discharge (40 CFR 230.21(b)). Please refer to the N-12 EIS, Section 4.4, Water Quality, for a discussion of each alternative's effect on suspended particulate materials and turbidity.

Suspended Sediment Effects Common to All Alternatives

Roadway runoff from any of the action alternatives is expected to be similar to existing conditions. Temporary, minor effects on suspended sediment may occur during construction and is expected to be similar for all action alternatives. Sediment may enter adjacent wetlands or waterways during construction, but the Nebraska Department of Roads (NDOR) would implement best management practices (BMPs) for construction storm water runoff that would minimize sediment from entering water bodies. Disruption of channel sediment and placement of fill would both temporarily increase turbidity downstream of the action.

K.1.3 Water (230.22)

Water is the part of the aquatic ecosystem in which organic and inorganic constituents are dissolved and suspended. It constitutes part of the liquid phase and is contained by the substrate. Water forms part of a dynamic aquatic life-supporting system. Water clarity, nutrients, and chemical content, physical and biological content, dissolved gas levels, pH, and temperature contribute to its life-sustaining capabilities (40 CFR 230.22(a)).

Possible loss of environmental characteristics and values: The discharge of dredged or fill material can change the chemistry and physical characteristics of the receiving water at a disposal site through the introduction of chemical constituents in suspended or dissolved form. Changes in the clarity, color, odor, and taste of water and the addition of contaminants can reduce or eliminate the suitability of water bodies for populations of aquatic organisms, and for human consumption, recreation, and aesthetics. The introduction of nutrients or organic material to the water column as a result of the discharge can lead to a high biochemical oxygen demand (BOD), which in turn can lead to reduced dissolved oxygen, thereby potentially affecting the survival of many aquatic organisms. Increases in nutrients can favor one group of organisms such as algae to the detriment of other more desirable types, such as submerged aquatic vegetation, potentially causing adverse health effects, objectionable tastes and odors, and other problems (40 CFR 230.22(b)). Please refer to the N-12 EIS, Section 4.4, Water Quality, for a discussion of each alternative's effect on water.

No-Action Alternative

The No-Action Alternative would involve continued maintenance of the existing N-12 roadway. Impacts on water quality are due to flooding of the existing roadway and the potential for

overtopping. Large precipitation events or high volume releases from Fort Randall Dam may cause flooding in the Study Area.

Water Quality Effects Common to All Action Alternatives

Each action alternative provides improved hydraulic connectivity relative to the existing condition. The increased size of culverts and longer lengths of bridges to span the floodplain would have a positive effect on water clarity, nutrients, and chemical content, physical and biological content, dissolved gas levels, pH, and temperature by increasing floodplain connectivity compared to existing conditions. In addition all action alternatives increase the height of the roadway relative to the 100-year floodplain and would prevent the roadway from being overtopped during high water conditions. However, each alternative would result in some level of fill in wetlands and waterways. Provided below is a brief description of the wetland and waterway impacts for each alternative. A summary of the wetland impacts is provided in Table K-1.

Alternative A1 – This alternative would impact approximately 147.4 acres of wetlands, which includes 29.88 acres of open water. Alternative A1 would also result in 39 linear feet of channel loss and 1,969 linear feet of channel impact; the least amount of waterway impact of all the alternatives.

Alternative A2 – This alternative would permanently impact a total of 142.3 acres of wetlands, including 18.89 acres of open water habitat. As compared to the other alternatives, Alternative A2 would impact the largest amount of wetlands. Alternative A2 would also result in a channel gain of 46 linear feet but would impact 2,741 feet of channel.

Alternative A3 – This alternative would permanently impact 122.3 acres of wetlands, which includes 15.42 acres of open water. In addition, construction of Alternative A3 would result in a channel gain of 155 linear feet but would impact 2,763 linear feet of channel.

NDOR's Applied-for Project, Alternative A7 – Construction of this alternative would impact 90.8 acres of wetland, which includes 5.15 acres of open water impact. Alternative A7 would also result in a channel gain of 206 linear feet but would impact 2,763 feet of channel.

When considering the impacts associated with the four floodplain alternatives (A1, A2, A3, and A7), rising groundwater levels and continued siltation of the Missouri River floodplain would likely develop additional wetlands in other areas over time. Because these floodplain wetland complexes are extremely large in area and have minimal plant diversity, the impacts on the floodplain wetlands under the floodplain alternatives would be considered minor because they are not impacting the overall function of the ecosystem.

K.1.4 Current Patterns and Water Circulation (230.23)

Current patterns and water circulation are the physical movements of water in the aquatic ecosystem. Currents and circulation respond to natural forces as modified by basin shape and cover, physical and chemical characteristics of water strata and masses, and energy dissipating factors (40 CFR 230.23(a)).

Possible loss of environmental characteristics and values: The discharge or dredged or fill material can modify current patterns and water circulation by obstructing flow, changing the direction or velocity of water flow, changing the direction or velocity of water flow and circulation, or otherwise

changing the dimensions of the water body. As a result, adverse changes can occur in: Location, structure, and dynamics of aquatic communities; shoreline and substrate erosion and deposition rates; the deposition of suspended particles; the rate and extent of mixing of dissolved and suspended components of the water body; and water stratification (40 CFR 230.23(b)). Please refer to the N-12 EIS, Section 4.6, Floodplains, for a discussion of each alternative's effect on current patterns and circulation.

No-Action Alternative

The No-Action Alternative includes maintaining the existing roadway. The existing current patterns and water circulation movements would not be altered.

Current Patterns and Water Circulation Effects Common to All Action Alternatives

Each action alternative provides improved hydraulic connectivity relative to the existing condition. The increased size of culverts and longer lengths of bridges to span the floodplain would have a positive effect on water patterns and circulation compared to the existing condition. The discharge of dredged or fill material, due to the size of the Missouri River floodplain, would have minimal effect on water patterns and water circulation.

K.1.5 Normal Water Fluctuations (230.24)

Normal water fluctuations in a natural aquatic system consist of daily, seasonal, and annual tidal and flood fluctuations in water level. Biological and physical components of such a system are either attuned to or characterized by these periodic water fluctuations (40 CFR 230.24(a)).

Possible loss of environmental characteristics and values: The discharge of dredged or fill material can alter the normal water-level fluctuation pattern of an area, resulting in prolonged periods of inundation, exaggerated extremes of high and low water, or a static, nonfluctuating water level. Such water level modifications may change salinity patterns, alter erosion or sedimentation rates, aggravate water temperature extremes, and upset the nutrient and dissolved oxygen balance of the aquatic ecosystem. In addition, these modifications can alter or destroy communities and populations of aquatic animals and vegetation, induce populations of nuisance organisms, modify habitat, reduce food supplies, restrict movement of aquatic fauna, destroy spawning areas, and change adjacent, upstream, and downstream areas (40 CFR 230.24(b)).

No-Action Alternative

The existing N-12 roadway has a delayed time of equilibrium between one side of the roadway and the other due to the number and size of existing culverts and bridges. Fort Randall Dam hydropower peaking influences water fluctuations of the Missouri River. The effects of the hydropower peaking diminish as distance from Fort Randall Dam increases. In addition, river flows influenced by events like drought or precipitation, affect the magnitude of the water fluctuations.

Normal Water Fluctuation Effects Common to All Action Alternatives

All of the action alternatives would have a greater number of and larger sized culverts and bridges compared to the existing condition to allow for a faster equilibrium of the floodplain. The action alternatives would not impact normal water fluctuations long-term and would likely improve them

compared to existing conditions. It is unlikely that construction would alter normal water-level fluctuation patterns because the amount of fill relative to the amount of wetlands and other waters of the U.S. is minimal. The water fluctuations due to Fort Randall Dam power peaking would continue to be observed in the west segment.

Current Patterns and Water Circulation Effects Specific to Alternative A7

Alternative A7, with larger bridge lengths, would provide a higher amount of connectivity. Larger bridge lengths would allow for a faster response to changing water levels on either side of the roadway compared to the existing condition.

K.1.6 Salinity Gradients (230.25)

Salinity gradients form where salt water from the ocean meets and mixes with freshwater from land (40 CFR 230.25(a)). The Project is not located in or near an ocean; therefore, impacts to salinity gradients do not apply to this Project. No impacts would occur to salinity gradients with the project because all of the aquatic resources are fresh water.

K.2 POTENTIAL IMPACTS ON BIOLOGICAL CHARACTERISTICS OF THE AQUATIC ECOSYSTEM (SUBPART D)

K.2.1 Threatened, Endangered and Candidate Species (230.30)

An endangered species is a plant or animal in danger of extinction throughout all or a significant portion of its range. A threatened species is one in danger of becoming an endangered species in the foreseeable future throughout all or a significant portion of its range. Listings of threatened and endangered species as well as critical habitats are maintained by some individual states and by the U.S. Department of the Interior, U.S. Fish and Wildlife Service (USFWS). Section 7 (a) of the Endangered Species Act requires Federal agencies to consult with USFWS prior to agency action, in this case, the decision whether or not to grant the Section 404 permit. Possible loss of values: The major potential impacts on threatened or endangered species from the discharge of dredged or fill material include:

(1) Covering or otherwise directly killing species;

(2) The impairment or destruction of habitat to which these species are limited. Elements of the aquatic habitat which are particularly crucial to the continued survival of some threatened or endangered species include adequate good quality water, spawning and maturation areas, nesting areas, protective cover, adequate and reliable food supply, and resting areas for migratory species. Each of these elements can be adversely affected by changes in either the normal water conditions for clarity, chemical content, nutrient balance, dissolved oxygen, pH, temperature, salinity, current patterns, circulation and fluctuation, or the physical removal of habitat; and

(3) Facilitating incompatible activities (40 CFR 230.30(b)).

Where consultation with the Secretary of the Interior occurs under Section 7(a) of the Endangered Species Act, the conclusions of the Secretary concerning the impact(s) of the discharge on threatened and endangered species and their habitat shall be considered final (40 CFR 230.30(c)).

Please refer to the N-12 EIS, Section 4.3, Protected Species, and Appendix E, Protected Species Technical Memorandum, for a discussion of each alternative's effect on threatened, endangered, or candidate species.

K.2.2 Fish, Crustaceans, Mollusks, and Other Aquatic Organisms (230.31)

Aquatic organisms in the food web include, but are not limited to, finfish, crustaceans, mollusks, insects, annelids, planktonic organisms, and the plants and animals on which they feed and depend upon for their needs. All forms and life stages of an organism, throughout its geographic range, are included in this category (40 CFR 230.31(a)).

Possible loss of values: The discharge of dredged or fill material can variously affect populations of fish, crustaceans, mollusks and other food web organisms through the release of contaminants which adversely affect adults, juveniles, larvae, or eggs, or result in the establishment or proliferation of an undesirable competitive species of plant or animal at the expense of the desired resident species. Suspended particulates settling on attached or buried eggs can smother the eggs by limiting or sealing off their exposure to oxygenated water. Discharge of dredged and fill material may result in the debilitation or death of sedentary organisms by smothering, exposure to chemical contaminants in dissolved or suspended form, exposure to high levels of suspended particulates, reduction in food supply, or alteration of the substrate upon which they are dependent. Mollusks are particularly sensitive to the discharge of material during periods of reproduction and growth and development due primarily to their limited mobility. They can be rendered unfit for human consumption by tainting, by production and accumulation of toxins, or by ingestion and retention of pathogenic organisms, viruses, heavy metals or persistent synthetic organic chemicals. The discharge of dredged or fill material can redirect, delay, or stop the reproductive and feeding movements of some species of fish and crustacea, thus preventing their aggregation in accustomed places such as spawning or nursery grounds and potentially leading to reduced populations. Reduction of detrital feeding species or other representatives of lower trophic levels can impair the flow of energy from primary consumers to higher trophic levels. The reduction or potential elimination of food chain organism populations decreases the overall productivity and nutrient export capability of the ecosystem (40 CFR 230.31(b)).

Please refer to the N-12 EIS, Section 4.2, Fish and Wildlife, and Appendix D, Fish and Wildlife Technical Memorandum, for a discussion of each alternative's effect on fish, crustaceans, mollusks, and other aquatic organisms.

K.2.3 Impacts on Other Wildlife (230.32)

Wildlife associated with aquatic ecosystems are resident and transient animals, birds, reptiles, and amphibians (40 CFR 230.32(a)).

Possible loss of values: The discharge of dredged or fill material can result in the loss or change of breeding and nesting areas, escape cover, travel corridors, and preferred food sources for resident and transient wildlife species associated with the aquatic ecosystem. These adverse impacts upon wildlife habitat may result from changes in water levels, water flow and circulation, salinity, chemical content, and substrate characteristics and elevation. Increased water turbidity can adversely affect wildlife species which rely upon sight to feed, and disrupt the respiration and feeding of certain aquatic wildlife and food chain organisms. The availability of contaminants from the discharge of dredged or fill material may lead to the bioaccumulation of such contaminants in wildlife. Changes in

such physical and chemical factors of the environment may favor the introduction of undesirable plant and animal species at the expense of resident species and communities. In some aquatic environments lowering plant and animal species diversity may disrupt the normal functions of the ecosystem and lead to reductions in overall biological productivity (40 CFR 230.32(b)).

Please refer to the N-12 EIS, Section 4.2, Fish and Wildlife, and Appendix D, Fish and Wildlife Technical Memorandum, for a discussion of each alternative's effect on other wildlife.

K.3 POTENTIAL IMPACTS ON SPECIAL AQUATIC SITES (SUBPART E)

K.3.1 Sanctuaries and Refuges (230.40)

Sanctuaries and refuges consist of areas designated under State and Federal laws or local ordinances to be managed principally for the preservation and use of fish and wildlife resources (40 CFR 230.40(a)).

Possible loss of values: Sanctuaries and refuges may be affected by discharges of dredged or fill material which will:

(1) Disrupt the breeding, spawning, migratory movements or other critical life requirements of resident or transient fish and wildlife resources;

(2) Create unplanned, easy and incompatible human access to remote aquatic areas;

(3) Create the need for frequent maintenance activity;

(4) Result in the establishment of undesirable competitive species of plants and animals;

(5) Change the balance of water and land areas needed to provide cover, food, and other fish and wildlife habitat requirements in a way that modifies sanctuary or refuge management practices;

(6) Result in any of the other adverse impacts discussed in subparts C and D as they relate to a particular sanctuary or refuge (40 CFR 230.40(b)).

Please refer to the N-12 EIS, Section 4.9, Recreation, for a discussion of impacts on Bazile Creek Wildlife Management Area (WMA).

K.3.2 Wetlands (230.41)

Wetlands consist of areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

Where wetlands are adjacent to open water, they generally constitute the transition to upland. The margin between wetland and open water can best be established by specialists familiar with the local environment, particularly where emergent vegetation merges with submerged vegetation over a broad area in such places as the lateral margins of open water, headwaters, rainwater catch basins, and groundwater seeps. The landward margin of wetlands also can be identified by specialists familiar with the local environment when vegetation from the two regions merges over a broad area.

Wetland vegetation consists of plants that require saturated soils to survive (obligate wetland plants) as well as plants, including certain trees, that gain a competitive advantage over others because they can tolerate prolonged wet soil conditions and their competitors cannot. In addition to plant populations and communities, wetlands are delimited by hydrological and physical characteristics of the environment. These characteristics should be considered when information about them is needed to supplement information available about vegetation, or where wetland vegetation has been removed or is dormant (40 CFR 230.41(a)).

Possible loss of values: The discharge of dredged or fill material in wetlands is likely to damage or destroy habitat and adversely affect the biological productivity of wetlands ecosystems by smothering, by dewatering, by permanently flooding, or by altering substrate elevation or periodicity of water movement. The addition of dredged or fill material may destroy wetland vegetation or result in advancement of succession to dry land species. It may reduce or eliminate nutrient exchange by a reduction of the system's productivity, or by altering current patterns and velocities. Disruption or elimination of the wetland system can degrade water quality by obstructing circulation patterns that flush large expanses of wetland systems, by interfering with the filtration function of wetlands, or by changing the aquifer recharge capability of a wetland. Discharges can also change the wetland habitat value for fish and wildlife as discussed in subpart D. When disruptions in flow and circulation patterns occur, apparently minor loss of wetland acreage may result in major losses through secondary impacts. Discharging fill material in wetlands as part of municipal, industrial or recreational development may modify the capacity of wetlands to retain and store floodwaters and to serve as a buffer zone shielding upland areas from wave actions, storm damage and erosion (40 CFR 230.41(b)).

The proposed project would result in the unavoidable discharge of fill material into wetlands and other waters of the U.S. and would permanently impact wetlands and other waters of the U.S. In the N-12 EIS, Section 4.5, Wetlands and Waters of the U.S., and Appendix F, Wetlands and Other Waters of the U.S. Technical Memorandum, contain a detailed description of wetlands and other waters of the U.S. that would be affected by the Project. A summary of the permanent wetland impacts resulting from each action alternative is provided in Table K-1.

Table K-1: Permanent Impacts on Wetlands and Open Water

Type[1]	Alternative A1 (acres)		Alternative A2 (acres)		Alternative A3 (acres)		Alternative A7 (acres)	
	West	**East**	**West**	**East**	**West**	**East**	**West**	**East**
PEMA	12.07	21.14	19.96	18.64	13.73	21.01	13.65	19.12
PEMC	4.78	13.61	3.45	14.86	3.72	13.89	3.71	9.80
PEMF	37.90	23.20	36.99	25.10	33.76	15.78	24.41	9.96
PSSA	0.25	0.47	0.09	0.67	0.00	0.65	0.00	0.65
PFOA	0.00	4.12	0.00	3.64	0.21	4.09	0.21	4.19
PUBG (Open Water)	16.81	13.07	10.52	8.37	6.03	9.39	2.84	2.31
Total Wetlands	71.81	75.61	71.01	71.28	57.45	64.81	44.82	46.03
	147.42		142.29		122.26		90.85	

Note:
[1] *PEMA = Palustrine Emergent Temporarily Flooded*
PEMC = Palustrine Emergent Seasonally Flooded
PEMF = Palustrine Emergent Semi-permanently Flooded
PSSA = Palustrine Scrub-Shrub Temporarily Flooded
PFOA = Palustrine Forested Temporarily Flooded
PUBG = Palustrine Unconsolidated Bottom Intermittently Flooded

Source:
Alfred Benesch & Company. 2015. Email message from Patrick Kastl, Alfred Benesch & Company, to Matt Pillard, HDR, regarding new wetland and waterway impact calculations. April 7.

K.3.3 Mudflats (230.42)

Mudflats are broad flat areas along the sea coast and in coastal rivers to the head of tidal influence and in inland lakes, ponds, and riverine systems (40 CFR 230.42(a)). No direct effects to mudflats were identified as part of the N-12 EIS.

K.3.4 Vegetated Shallows (230.43)

Vegetated shallows are permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as turtle grass and eelgrass in estuarine or marine systems as well as a number of freshwater species in rivers and lakes (40 CFR 230.43(a)). No direct effects to vegetated shallows were identified as part of the N-12 EIS.

K.3.5 Coral Reefs (230.44)

Coral reefs consist of the skeletal deposit, usually of calcareous or silicaceous materials, produced by the vital activities of anthozoan polyps or other invertebrate organisms present in growing portions of the reef (40 CFR 230.44(a)). No coral reefs exist within the N-12 Study Area.

K.3.6 Riffle and Pool Complexes (230.45)

Steep gradient sections of streams are sometimes characterized by riffle and pool complexes. Such stream sections have recognizable hydraulic characteristics. The rapid movement of water over a coarse substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. Pools are characterized by a slower stream velocity, a streaming flow, a smooth surface, and a finer substrate. Riffle and pool complexes are particularly valuable habitat for fish and wildlife (40 CFR 230.45(a)).

Possible loss of values: Discharge of dredged or fill material can eliminate riffle and pool areas by displacement, hydrologic modification, or sedimentation. Activities which affect riffle and pool areas and especially riffle/pool ratios, may reduce the aeration and filtration capabilities at the discharge site and downstream, may reduce stream habitat diversity, and may retard repopulation of the disposal site and downstream waters through sedimentation and the creation of unsuitable habitat. The discharge of dredged or fill material which alters stream hydrology may cause scouring or sedimentation of riffles and pools. Sedimentation induced through hydrological modification or as a direct result of the deposition of unconsolidated dredged or fill material may clog riffle and pool areas, destroy habitats, and create anaerobic conditions. Eliminating pools and meanders by the discharge of dredged or fill material can reduce water holding capacity of streams and cause rapid runoff from a watershed. Rapid runoff can deliver large quantities of flood water in a short time to downstream areas resulting in the destruction of natural habitat, high property loss, and the need for further hydraulic modification (40 CFR 230.45(b)).

Streams are located within the N-12 Study Area. NDOR would construct bridges over Ponca Creek and its tributaries, Henry Miller Creek, Medicine Creek, Bazile Creek and unnamed tributaries to the Missouri River. No direct effects to riffle and pool complexes are anticipated (see the N-12 EIS, Section 4.5, Wetlands and Waters of the U.S., and Appendix F, Wetlands and Other Waters of the U.S. Technical Memorandum).

K.4 POTENTIAL IMPACTS ON HUMAN USE CHARACTERISTICS (SUBPART F)

K.4.1 Municipal and Private Water Supplies (230.50)

Municipal and private water supplies consist of surface water or ground water which is directed to the intake of a municipal or private water supply system (40 CFR 230.50(a)).

Possible loss of values: Discharges can affect the quality of water supplies with respect to color, taste, odor, chemical content and suspended particulate concentration, in such a way as to reduce the fitness of the water for consumption. Water can be rendered unpalatable or unhealthy by the addition of suspended particulates, viruses and pathogenic organisms, and dissolved materials. The expense of removing such substances before the water is delivered for consumption can be high. Discharges may also affect the quantity of water available for municipal and private water supplies. In addition, certain commonly used water treatment chemicals have the potential for combining with some suspended or dissolved substances from dredged or fill material to form other products that can have a toxic effect on consumers (40 CFR 230.50(b)).

Please refer to the N-12 EIS, Section 4.4, Water Quality, for a discussion of effects on municipal and private water supplies.

K.4.2 Recreational and Commercial Fisheries (230.51)

Recreational and commercial fisheries consist of harvestable fish, crustaceans, shellfish, and other aquatic organisms used by man (40 CFR 230.51(a)).

Possible loss of values: Discharges can affect the quality of water supplies with respect to color, taste, odor, chemical content and suspended particulate concentration, in such a way as to reduce the fitness of the water for consumption. Water can be rendered unpalatable or unhealthy by the addition of suspended particulates, viruses and pathogenic organisms, and dissolved materials. The expense of removing such substances before the water is delivered for consumption can be high. Discharges may also affect the quantity of water available for municipal and private water supplies. In addition, certain commonly used water treatment chemicals have the potential for combining with some suspended or dissolved substances from dredged -or fill material to form other products that can have a toxic effect on consumers (40 CFR 230.51(b)).

See the N-12 EIS, Section 4.9, Recreation, for a discussion of impacts on Bazile Creek WMA.

K.4.3 Water-Related Recreation (230.52)

Water-related recreation encompasses activities undertaken for amusement and relaxation. Activities encompass two broad categories of use: consumptive, such as harvesting resources by hunting and fishing; and non-consumptive, such as canoeing and sight-seeing (40 CFR 230.52(a)).

Possible loss of values: One of the more important direct impacts of dredged or fill disposal is to impair or destroy the resources which support recreation activities. The disposal of dredged or fill material may adversely modify or destroy water use for recreation by changing turbidity, suspended particulates, temperature, dissolved oxygen, dissolved materials, toxic materials, pathogenic organisms, quality of habitat, and the aesthetic qualities of sight, taste, odor, and color (40 CFR 230.52(b)).

See the N-12 EIS, Section 4.9, Recreation, for a discussion of impacts on Bazile Creek WMA.

K.4.4 Aesthetics (230.53)

Aesthetics associated with the aquatic ecosystem consist of the perception of beauty by one or a combination of the senses of sight, hearing, touch, and smell. Aesthetics of aquatic ecosystems apply to the quality of life enjoyed by the general public and property owners (40 CFR 230.53(a)).

Possible loss of values: The discharge of dredged or fill material can mar the beauty of natural aquatic ecosystems by degrading water quality, creating distracting disposal sites, inducing inappropriate development, encouraging unplanned and incompatible human access, and by destroying vital elements that contribute to the compositional harmony or unity, visual distinctiveness, or diversity of an area. The discharge of dredged or fill material can adversely affect the particular features, traits, or characteristics of an aquatic area which make it valuable to property owners. Activities which degrade water quality, disrupt natural substrate and vegetational characteristics, deny access to or visibility of the resource, or result in changes in odor, air quality, or noise levels may reduce the value of an aquatic area to private property owners (40 CFR 230.53(b)).

See the N-12 EIS, Section 4.7, Visual, and Appendix M, Visual Analysis Technical Memorandum, for a discussion of Project effects on aesthetics.

K.4.5 Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves (230.54)

These preserves consist of areas designated under Federal and State laws or local ordinances to be managed for their aesthetic, educational, historical, recreational, or scientific value (40 CFR 230.54(a)).

Possible loss of values: The discharge of dredged or fill material into such areas may modify the aesthetic, educational, historical, recreational, and/or scientific qualities, thereby reducing or eliminating the uses for which such sites are set aside and managed (40 CFR 230.54(b)). The N-12 EIS did not identify direct impacts on any parks, monuments, national seashores, wilderness areas, or research sites (see Section 4.9, Recreation). See Appendix A for a discussion of the impact of NDOR's proposed action on the MNRR.

K.5 EVALUATION AND TESTING (SUBPART G)

Fill materials would be used to construct the new N-12 roadway, as well as access roads. Fill materials would be obtained from a borrow site identified and permitted by the contractor and would include soil, gravel and rock. Concrete would be brought to the site from nearby areas and would be used to construct the roadway, bridges and culverts. No materials from contaminated sites would be used as fill, so no testing of fill material to be placed in wetlands or waters of the U.S. is warranted.

K.6 ACTIONS TO MINIMIZE ADVERSE EFFECTS AND PRACTICABLE STEPS TO MINIMIZE POTENTIAL ADVERSE IMPACTS (SUBPART H)

In the N-12 EIS, mitigation strategies are discussed in the various resource sections in Chapter 4.0 and are summarized in Chapter 5.0. NDOR would, to the extent possible, avoid and minimize impacts to wetlands and other waters of the U.S. For all unavoidable impacts to wetlands and other waters of the U.S., NDOR would mitigate for impacts. NDOR's Section 404 permit contains information that addresses mitigation. See the N-12 EIS, Chapter 5.0, for all of the proposed avoidance, minimization, and mitigation strategies for each of the action alternatives.

K.6.1 Actions Concerning the Location of Discharge (230.70)

The effects of discharge can be minimized by the choice of the disposal site. Some of the ways to accomplish this are by:

a) Locating and confining the discharge to minimize smothering of organisms;

b) Designing the discharge to avoid a disruption of periodic water inundation patterns;

c) Selecting a disposal site that has been used previously for dredged material discharge;

d) Selecting a disposal site at which the substrate is composed of material similar to that being discharge, such as discharging sand on sand or mud on mud;

e) Selecting the disposal site, the discharge point, and the method of discharge to minimize the extent of any plume;

f) Designing the discharge of dredged or fill material to minimize or prevent the creation of standing bodies in water in areas of normally fluctuating water levels, and minimize or prevent the drainage of areas subject to such fluctuations (40 CFR 230.70).

K.6.2 Actions Concerning the Material to be Discharged, Controlling the Material after Discharge, and the Method of Dispersion and Related Technology (230.71, 230.72, 230.73, and 230.74)

The effects of a discharge can be minimized by treatment of, or limitations on the material itself, such as:

a) Disposal of dredged material in such a manner that physiochemical conditions are maintained and the potency and availability of pollutants are reduced;

b) Limiting the solid, liquid, and gaseous components of material to be discharged at a particular site;

c) Adding treatment substances to the discharge material;

d) Utilizing chemical flocculants to enhance the deposition of suspended particulates in diked disposal areas (40 CFR 230.71).

The effects of the dredged material after discharge may be controlled by:

a) Selecting discharge methods and disposal sites where the potential for erosion, slumping or leaching of materials into the surrounding aquatic ecosystem will be reduced. These sites or methods include, but are not limited to:

    1. Using containment levees, sediment basins, and cover crops to reduce erosion;

    2. Using lined containment areas to reduce leaching where leaching of chemical constituents from the discharge material is expected to be a problem;

b) Capping in-place contaminated material with clean material or selectively discharging the most contaminated material first to be capped with the remaining material;

c) Maintaining and containing discharged material properly to prevent point and non point sources of pollution;

d) Timing the discharge to minimize impact, for instance during periods of unusual high water flows, wind, wave, and tidal actions (40 CFR 230.72).

The effects of discharge can be minimized by the manner is which it is dispersed, such as:

a) Where environmentally desirable, distributing the dredged material widely in a thin layer at the disposal site to maintain natural substrate contours and elevation;

b) Orienting a dredged or fill material mound to minimize undesirable obstruction to the water current or circulation pattern, and utilizing natural bottom contours to minimize the size of the mound;

c) Using silt screens or other appropriate methods to confine suspended particulate/turbidity to a small area where settling or removal can occur;

d) Making use of currents and circulation patterns to mix, disperse, and dilute the discharge;

e) Minimizing water column turbidity by using a submerged diffuser system. A similar effect can be accomplished by submerging pipeline discharges or otherwise releasing materials near the bottom;

f) Selecting sites or managing discharges to confine and minimize the release of suspended particulates to give decreased turbidity levels and to maintain light penetration for organisms;

g) Setting limitations on the amount of material to be discharged per unit of time or volume of receiving water (40 CFR 230.73).

Discharge technology should be adapted to the needs of each site. In determining whether the discharge operation sufficiently minimizes adverse environmental impacts, the applicant should consider:

a) Using appropriate equipment or machinery, including protective devices, and the use of such equipment or machinery in activities related to the discharge of dredged or fill material;

b) Employing appropriate maintenance and operation on equipment or machinery, including adequate training, staffing, and working procedures;

c) Using machinery and techniques that are especially designed to reduce damage to wetlands. This may include machines equipped with devices that scatter rather than mound excavated materials, machines with specially designed wheels or tracks; and the use of mats under heavy machines to reduce wetland surface compaction and rutting;

d) Designing access roads and channel spanning structures using culverts, open channels, and diversions that will pass both low and high water flows, accommodate fluctuating water levels, and maintain circulation and faunal movement;

e) Employing appropriate machinery and methods of transport of the material for discharge (40 CFR 230.74).

No material that contains hazardous materials would be discharged into a water of the U.S. BMPs would be used to control the material after discharge. Temporary and permanent erosion-control devices would be used during construction to control discharges into waters of the U.S.

K.6.3 Actions Affecting Plant and Animal Populations (230.75)

Minimization of adverse effects on populations of plant and animals can be achieved by:

a) Avoiding changes in water current and circulation patterns which would interfere with the movement of animals;

b) Selecting sites or managing discharges to prevent or avoid creating habitat conducive to the development of undesirable predators or species which have a competitive edge ecologically over indigenous plants or animals;

c) Avoiding sites having unique habitat or other value, including habitat or threatened or endangered species;

d) Using planning and construction practices to institute habitat development and restoration to produce a new or modified environmental state of higher ecological value by displacement of some or all of the existing environmental characteristics. Habitat development and restoration techniques can be used to minimize adverse impacts and to compensate for destroyed habitat. Use techniques that have been demonstrated to be effective in circumstances similar to those under consideration whenever possible. Where proposed development and restoration techniques have not yet advanced to the pilot demonstration stage, initiate their use on a small scale to allow corrective action if unanticipated adverse impacts occur;

e) Timing discharge to avoid spawning or migration seasons and other biologically critical time periods;

f) Avoiding the destruction of remnant natural sites within areas affected by development (40 CFR 230.75).

The N-12 Project would not impact any habitat that is considered special or remnant for any plan or animal in the Study Area. BMPs would be followed during all phases of Project construction. Temporary and permanent erosion control would take place, and would include such efforts such as sediment control and revegetation. Weed control and weed management would take place during all phases of construction. Certain construction activities would be timed to prevent impact to active migratory bird nests or other biologically critical time periods. See the N-12 EIS, Section 4.2, Fish and Wildlife, and Section 4.3, Protected Species.

K.6.4 Actions Affecting Human Use (230.76)

Minimization of adverse effects on human use potential may be achieved by:

a) Selecting discharge sites and following discharge procedures to prevent or minimize any potential discharge to the aesthetically pleasing features of the aquatic site (e.g. viewscapes), particularly with respect to water quality;

b) Selecting disposal sites which are not valuable as natural aquatic areas;

c) Timing the discharge to avoid the seasons or periods when human recreational activity associated with the aquatic site is most important;

d) Following discharge procedures which avoid or minimize the disturbance to aesthetic features of an aquatic site or ecosystem;

e) Selecting sites that will not be detrimental or increase incompatible human activity or require the need for frequent dredge or fill maintenance activity in remote fish and wildlife areas;

f) Locating the disposal site outside of the vicinity of a public water supply intake (40 CFR 230.76).

Construction of the N-12 Project would take place so that disruptions to traffic are minimized to the greatest extent possible. See the N-12 EIS, Section 4.4, Water Quality, for a discussion of impacts to public water supply; see Section 4.7, Visual, for a discussion of impacts on aesthetic features; and see Section 4.9, Recreation for a discussion of impacts on recreational activities.

K.6.5 Other Actions (230.77)

In the case of fills, controlling runoff and other discharges from activities to be conducted on the fill (40 CFR 230.77(a)). During fill placement, NDOR would adopt BMPs to control runoff and other discharges.

K.7 REFERENCES

Alfred Benesch & Company. 2015. Email message from Patrick Kastl, Alfred Benesch & Company, to Matt Pillard, HDR, regarding new wetland and waterway impact calculations. April 7.

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